IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

FRACTUS, S.A.,	§	
	§	
Plaintiff,	§	
	§	
v.	§	**Case No. 2:17-CV-00561-JRG**
	§	
ZTE CORPORATION, ZTE (USA) INC., ZTE (TX), INC.,	§	
	§	
Defendants.	§	

MEMORANDUM OPINION AND ORDER

On August 28, 2018, the Court held a hearing to determine the proper construction of the disputed claim terms in United States Patent Nos. 7,394,432 ("the '432 Patent"), 7,397,431 ("the '431 Patent"), 8,941,541 ("the '541 Patent"), 8,976,069 ("the '069 Patent"), 9,054,421 ("the '421 Patent"), 9,240,632 ("the '632 Patent"), and 9,362,617 ("the '617 Patent".) The Court has considered the arguments made by the Parties at the hearing and in their claim construction briefs. (*See* Dkt. Nos. 77, 82, 85.) The Court has also considered the intrinsic evidence and made subsidiary factual findings about the extrinsic evidence. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005); *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015). The Court issues this Claim Construction Memorandum and Order in light of these considerations.

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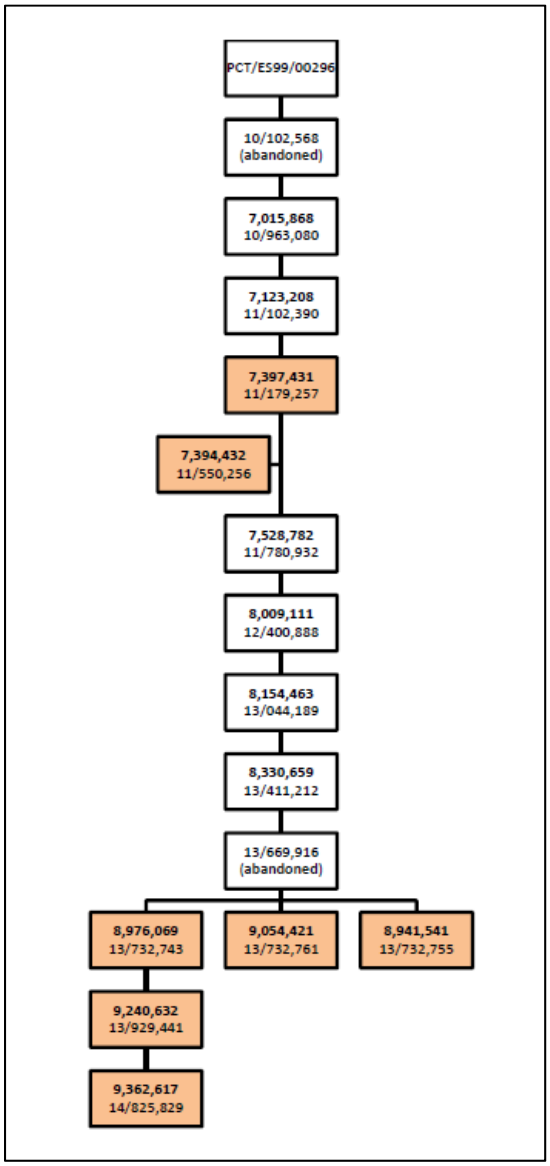
I. BACKGROUND

This case involves seven patents (the "Asserted Patents") that claim priority to a 1999 Spanish PCT application. A family tree of the Asserted Patents, known as the "Multilevel Patents" or "MLV Patents" follows:



(Dkt. No. 77-2 at 2 (Asserted Patents shaded).[1]) The term "multilevel" describes the configuration of an antenna, which requires "at least two levels of detail" in the antenna design. '432 Patent at

[1] The specifications of the Asserted Patents are virtually identical. The parties cite to the

2:60–64. The specification states "the essence of the invention is found in the geometry used in the multilevel structure." *Id.* at 6:3–4. According to the specification, this "geometry is much more flexible, rich and varied, allowing operation of the antenna from two to many more bands, as well as providing a greater versatility as regards diagrams, band positions and impedance levels, to name a few examples. Although they are not fractal, multilevel antennae are characterised in that they comprise a number of elements which may be distinguished in the overall structure." *Id.* at 2:32–39. Specifically, multilevel antennae "clearly show several levels of detail (that of the overall structure and that of the individual elements which make it up)" and "provide a multiband behavior and/or a small size." *Id.* at 2:39–42.

Claim 1 of the '431 Patent is an exemplary claim and recites the following elements (disputed term in italics):

1. A multi-band antenna comprising:

> a conductive radiating element including at least one *multilevel structure*,
>
> said at least one *multilevel structure* comprising a plurality of electromagnetically coupled *geometric elements*,
>
> said plurality of *geometric elements* including at least three portions, a first portion being associated with a first selected *frequency band*, a second portion being associated with a second selected *frequency band* and a third portion being associated with a third selected *frequency band*, *said second and third portions being located substantially within the first portion*, said first, second and third portions defining empty spaces in an *overall structure of the conductive radiating element* to provide a circuitous current path within the first portion, within the second portion and within the third portion, and
>
> the current within said first portion providing said first selected *frequency band* with radio electric behavior substantially similar to the radio electric behavior of said second and third selected *frequency bands*, the current within the second portion providing said second selected *frequency band* with radio electric behavior substantially similar to the radio electric behavior of said first and third selected *frequency bands*, and the current

specification of the '432 Patent, and the Court will generally do the same.

> within the third portion providing said third selected *frequency band* with radio electric behavior substantially similar to the radio electric behavior of said first and second selected *frequency bands*.

II. APPLICABLE LAW

A. Claim Construction

This Court's claim construction analysis is guided by the Federal Circuit's decision in *Phillips v. AWH Corporation*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). In *Phillips*, the Federal Circuit reiterated that "the claims of a patent define the invention to which the patentee is entitled the right to exclude." 415 F.3d at 1312. The starting point in construing such claims is their ordinary and customary meaning, which "is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Id.* at 1312–13.

However, *Phillips* made clear that "the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id.* at 1313. For this reason, the specification is often 'the single best guide to the meaning of a disputed term.'" *Id.* at 1315. However, it is the claims, not the specification, which set forth the limits of the patentee's invention. *Id.* at 1312. Thus, "it is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited." *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004). Other asserted or unasserted Claims can also aid in determining a claim's meaning. *See, e.g., Phillips*, 415 F.3d at 1314 (use of "steel baffles" and "baffles" implied that "baffles" did not inherently refer to objects made of steel).

The prosecution history also plays an important role in claim interpretation as intrinsic evidence of how the U.S. Patent and Trademark Office ("PTO") and the inventor understood the patent. *Phillips*, 415 F.3d at 1317; *see also Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d 1340, 1350 (Fed. Cir. 2004) (noting that "a patentee's statements during prosecution, whether relied on by the examiner or not, are relevant to claim interpretation"); *Aylus Networks, Inc. v. Apple Inc.*, 856 F.3d 1353, 1361 (Fed. Cir. 2017) (applying this principle in the context of *inter partes* review proceedings). However, "because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.* at 1318; *see also Athletic Alternatives, Inc. v. Prince Mfg.*, 73 F.3d 1573, 1580 (Fed. Cir. 1996) (ambiguous prosecution history may be "unhelpful as an interpretive resource").

In addition to intrinsic evidence, courts may rely on extrinsic evidence such as "expert and inventor testimony, dictionaries, and learned treatises." *Id.* at 1317. As the Supreme Court recently explained:

> In some cases . . . the district court will need to look beyond the patent's intrinsic evidence . . . to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period.

Teva Pharm. USA, Inc. v. Sandoz, Inc., 135 S. Ct. 831, 841 (2015). However, the Federal Circuit has emphasized that such extrinsic evidence is subordinate to intrinsic evidence. *Phillips*, 415 F.3d at 1317 ("[W]hile extrinsic evidence can shed useful light on the relevant art, we have explained that it is less significant than the intrinsic record in determining the legally operative meaning of claim language." (internal quotation marks omitted)).

III. CONSTRUCTION OF AGREED TERMS

The Parties agreed to the construction of the following terms/phrases:

Claim Term/Phrase	Agreed Construction
"non-convex geometric element" ('617 Patent Claim 17)	"a geometric element that is not convex"
"convex geometric element" ('617 Patent Claims 17)	"a geometric element in which each straight line joining each set of two points within the geometric element or on the boundary of the geometric element lies wholly inside or on the boundary of the geometric element"
"fraction of a total perimeter or a total area" ('421 Patent Claims 1, 11)	"less than 50% of a total perimeter or a total area"
"monopole configuration" ('617 Patent Claims 17, 19)	"an antenna comprising a radiating element and a ground plane, wherein a practical application, the ground plane is not infinite, and further where the antenna would produce a radiation pattern approximating that of an electric dipole in the half-space above the ground plane if the ground plane was infinite"
"structure for the multi-band antenna" ('617 Patent Claims 17, 19; '632 Patent Claim 17)	Term should be given the same construction as "multilevel structure"
"a substantially similar combined amount of resistance and reactance" ('617 Patent Claim 17)	"substantially similar combined amount of impedance level as characterized by the return loss (Lr) or equivalent SWR"
"substantially similar impedance level and radiation pattern" ('069 Patent Claim 33; '421 Patent Claim 1) "radio electric behavior substantially similar" ('431 Patent Claim 1; '432 Patent Claim 1; '541 Patent Claim 17)	These two terms have the same meaning. "substantially similar combined amount of impedance level as characterized by the return loss (Lr) or equivalent SWR, and substantially similar radiation pattern"

(Dkt. No. 77-15 at 2.) In view of the Parties' agreement on the construction of the identified terms, the Court hereby **ADOPTS** the Parties' agreed constructions.

IV. CONSTRUCTION OF DISPUTED TERMS

The Parties' dispute the meaning and scope of fourteen terms/phrases in the Asserted Patents. Each dispute is addressed below.

A. "multilevel structure" and "structure for the multi-band antenna"

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"multilevel structure"	"a structure for an antenna useable at multiple frequency bands with at least two levels of detail, wherein one level of detail makes up another level. These levels of detail are composed of polygons (polyhedrons) of the same type with the same number of sides (faces) wherein most of the polygons (polyhedrons) are clearly visible and individually distinguishable and most of the polygons (polyhedrons) having an area of contact, intersection or interconnection with other elements (polygons or polyhedrons) that is less than 50% of the perimeter or area."	"a structure for an antenna useable at multiple frequency bands with at least two levels of detail, wherein one level of detail makes up another level. These levels of detail are composed of polygons (polyhedrons) of the same type with the same number of sides (faces) wherein most (i.e., more than 75%) of the polygons (polyhedrons) are clearly visible and individually distinguishable and most (i.e., more than 75%) of the polygons (polyhedrons) having an area of contact, intersection or interconnection with other elements (polygons or polyhedrons) that is less than 50% of the perimeter or area."
"structure for the multi-band antenna"		

1. The Parties' Positions[2]

The term "multilevel structure" was construed in *Fractus, S.A. v. Samsung Elecs. Co., et al.*, 6:09-CV-203-LED-JDL. (*See* Dkt. Nos. 77-3 at 7–19; Dkt. No. 77-4.) The Parties agree with

[2] The Parties agree that the term "structure for the multi-band antenna" should be construed the same as the term "multilevel structure."

the prior construction except on one point. Defendants argue that "most of the polygons" should be further clarified to mean "more than 75%" of the polygons. (Dkt. No. 82 at 2.)

Plaintiff contends that the patentees coined "multilevel structure" to describe the antenna geometry disclosed in the MLV Patents. (Dkt. No. 77 at 3.) According to Plaintiff, the specification uniformly refers to a "multilevel structure" as incorporating multiple levels of detail in an antenna design. (*Id.*) (citing '432 Patent at 2:31–43, 2:60–64, 3:40–43, 4:66–5:6, 6:27–37.) Plaintiff argues that the levels of detail in a multilevel structure are constructed of polygons of the same type with the same number of sides. (*Id.* at 4 (citing '432 Patent at 5:8–11, 2:43–46, 3:8–11, 4:53–60).) Plaintiff contends that most of the polygons used to construct the multi-level structure are clearly visible and individually distinguishable because less than 50% of the perimeter or area of these polygons is in contact with other polygons. (*Id.* (citing '432 Patent at 2:35–38, 2:60–67, 3:8–11, 3:30–43, 5:36–38, 6:27–42).)

Regarding Defendants' construction, Plaintiff argues that the 75% requirement appears in a certain embodiment, but that it is not mandatory in every instance. (*Id.* at 5.) Plaintiff contends that the Summary does not mentions the 75% requirement, and instead requires that a "majority" or "most" of the elements exhibit this characteristic. (*Id.* (citing '432 Patent at 2:60–67, 3:8–11, 3:34–38).) According to Plaintiff, the plain and ordinary meaning of "majority" and "most" is more than 50%. (*Id.* at 6 (citing Dkt. Nos. 77-5; 77-6).)

Plaintiff concedes that certain embodiments include the "at least 75%" requirement, but argues that the Preferred Embodiment also notes that "at least most" of the component elements are individually identifiable when discussing certain examples. (*Id.* (citing '432 Patent at 4:63–5:6, 5:31–38).) According to Plaintiff, it is apparent that the term "multilevel" is used in instances

requiring only that a "majority" of the geometric elements meet the 50% perimeter-free requirement. (*Id.*)

Plaintiff further argues that the independent claims of the '432, '431 and '541 Patents do not recite the percentage of polygons that must meet the 50% perimeter-free requirement in a multilevel structure. (*Id.* at 6–7.) Plaintiff contends that certain dependent claims include the 75% requirement, and thus, under the doctrine of claim differentiation, it is presumed that "multilevel structure" in Claim 1 does not include the 75% requirement, (*id.* at 7 (citing '541 Patent at Claim 6),) and that other dependent claims specify a lower requirement for the percentage of geometric elements that must meet the 50% perimeter-free rule. (*Id.* (citing '431 Patent at Claim 22).) Plaintiff further argues that claims from unasserted patents explicitly require that 75% of the polygons must have less than 50% of their perimeter or area in contact. (*Id.* at 8 (citing the '868 Patent at Claim 1 (Dkt. No. 77-7); the '208 Patent at Claim 1 (Dkt. No. 77-8)).) According to Plaintiff, the inclusion of the 75% requirement in certain patent claims, but not in the Asserted Claims, supports the conclusion that the term "multilevel structure" does not include the 75% requirement. (*Id.*)

Defendants respond that the term "multilevel structure" does not have any meaning apart from the intrinsic evidence, because it is a term coined by the patentees. (Dkt. No. 82 at 3.) Defendants argue that the specification describes the defining attributes of the "present invention" as having the "at least 75%" requirement, (*id.* (citing '432 Patent at 4:51–5:1, 5:15–16),) that Plaintiff admitted the "at least 75%" requirement in the prosecution history, (*id.* (citing Dkt. No. 77-12 at 8–9),) and that Defendants' construction is consistent with the PTO's construction in the most recent reexamination. (*Id.* at 4 (citing Dkt. No. 82-2 at 4).)

Defendants further argue that Plaintiff does not point to anything in the specification that explains that "most" means anything other than "at least 75%." (*Id.*) Defendants also contend that Plaintiff's dictionary definitions do not apply to the coined term "multilevel structure." (*Id.*) Defendants argue that the dictionary excerpts only provide definitions for "majority," not "most." (*Id.* at 5.) Defendants also argue that the dictionaries are later in time than the alleged invention. (*Id.*)

Defendants next argue that Plaintiff's reliance on claim differentiation is unavailing, because the present invention is explained as having "at least 75%." (*Id.*) According to Defendants, Plaintiff's position is weakened by its reliance on dependent claims, and claims in other patents that were drafted after the original specification was filed that are not supported by the written description. (*Id.*)

Plaintiff replies that there are particular portions of the MLV patent family specification that provide the definition for a multilevel structure. (Dkt. No. 85 at 1 (citing '432 Patent at 2:60–6, 3:30–43; '868 Patent at 2:20–33, 2:48–56).) According to Plaintiff, these passages clarify that a multilevel structure only requires "most" or a "majority" of elements to have the perimeter characteristic. (*Id.*). Plaintiff contends that Defendants improperly focus on one passage. (*Id.* (citing '432 Patent at 4:51–5:1).) Plaintiff argues that even that passage continues with a statement referencing "most of the basic component elements," and notes that its "multilevel" name "is precisely due to this characteristic." (*Id.* (citing '432 Patent at 4:66–5:6).)

Regarding the prosecution history, Plaintiff argues that the claim pending in the PCT application included the "at least 75%" requirement, so it is not surprising the Response mentions it. (*Id.* at 1–2 (citing Dkt. No. 77-12 at 2).) Plaintiff further argues that the Response sought to distinguish a prior patent drawn to a fractal antenna, which met the "at least 75%" requirement.

(*Id.* at 2 (citing Dkt. No. 77-12 at 8).) According to Plaintiff, the Response emphasized that a multilevel geometry is flexible, and the contact zones can be varied, unlike a fractal design. (*Id.*)

Plaintiff also argues that statement by the PTO during the '432 Reexam should be given little weight during claim construction. (*Id.*) Plaintiff contends that the PTO also stated that "[d]ue to the above, one can individually distinguish most of the component polygons . . . ." (*Id.* (citing Dkt. No. 82-2 at 7).) Plaintiff contends that the ordinary meaning of "most" will be understood by a juror without further definition, and that the specification uses "most" and "majority" synonymously. (*Id.* (citing '432 Patent at 2:60–67, 3:30–43).)

Plaintiff further contends that the ordinary meaning should apply because the dispute is about the meaning of "most," and not the coined term "multilevel structure." (*Id.* at 2–3.) Finally, Plaintiff argues that the presence of a more specific requirement in a dependent claim raises a presumption that this specificity was not inherent in the independent claim requirement. (*Id.* (citing '541 Patent at Claims 1, 6).) According to Plaintiff, the MLV specification does not "consistently, and without exception," describe the MLV invention as requiring the "more than 75% of the elements" limitation. (*Id.* (citing '432 Patent at 2:60–67, 3:8–11, 3:30–38, 4:66–5:6, 5:36–38).)

For the following reasons, the Court finds that the terms **"multilevel structure"** and **"structure for the multi-band antenna"** should be construed to mean **"a structure for an antenna useable at multiple frequency bands with at least two levels of detail, wherein one level of detail makes up another level. These levels of detail are composed of polygons (polyhedrons) of the same type with the same number of sides (faces) wherein most of the polygons (polyhedrons) are clearly visible and individually distinguishable and most of the polygons (polyhedrons) having an area of contact, intersection or interconnection with other elements (polygons or polyhedrons) that is less than 50% of the perimeter or area."**

2. Analysis

The term "multilevel structure" appears in Asserted Claims 1, 14, and 30 of the '431 Patent; Asserted Claims 1 and 6 of the '432 Patent; and Asserted Claim 17 of the '541 Patent.[3] The Court finds that the term is used consistently in the claims and is intended to have the same general meaning in each claim. The term "structure for the multi-band antenna" appears in Asserted Claims 17 and 19 of the '617 Patent; and Asserted Claim 17 of the '632 Patent. The Court finds that the term is used consistently in the claims and is intended to have the same general meaning in each claim.

The Parties agree that the term "multilevel" was coined by the patentees to describe the antenna geometry disclosed in the Asserted Patents. (*See* Dkt. No. 77 at 3; Dkt. No. 82 at 3.) Therefore, the specification is the best source for determining what a person of ordinary skill in the art would understand the term to mean. *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1321 (Fed. Cir. 2013) ("Idiosyncratic language, highly technical terms, or terms coined by the inventor are best understood by reference to the specification.") (internal citation omitted). The Summary of the Invention ("Summary") states the following:

> *The present invention consists of an antenna whose radiating element is characterised by its geometrical shape,* which basically comprises s*everal polygons or polyhedrons of the same type*. That is, it comprises for example triangles, squares, pentagons, hexagons or even circles and ellipses as a limiting case of a polygon with a large number of sides, as well as tetrahedra, hexahedra, prisms, dodecahedra, etc. coupled to each other electrically (either through at least one point of contact o through a small separation providing a capacitive coupling) and grouped in structures of a higher level such that in the body of the antenna can be

[3] As indicated above, the term "multilevel structure" was previously construed in *Fractus, S.A. v. Samsung Elecs. Co., et al.*, 6:09-CV-203-LED-JDL (E.D. Tex. 2010) (Docket No. 526). As stated during the claim construction hearing, the Court is not bound to the previous construction. *Tex. Instruments, Inc. v. Linear Techs. Corp.*, 182 F. Supp. 2d 580, 586 (E.D. Tex. 2002) ("[T]hose district courts which have addressed the issue have concluded that defendants in a later proceeding involving previously construed patents should have the opportunity to brief and argue the issue of claim construction, notwithstanding any policy in favor of judicial uniformity.").

> identified the polygonal or polyhedral elements which it comprises. In turn, structures generated in this manner can be grouped in higher order structures in a manner similar to the basic elements, and so on until reaching as many levels as the antenna designer desires.
>
> *Its designation as multilevel antenna is precisely due to the fact that in the body of the antenna can be identified at least two levels of detail*: that of the overall structure and that of the majority of the elements (polygons or polyhedrons) which make it up. This is achieved by ensuring that the area of contact or intersection (if it exists) *between the majority of the elements forming the antenna is only a fraction of the perimeter or surrounding area of said, polygons or polyhedrons.*

'432 Patent at 2:44–67 (emphasis added). The sole dispute is whether the term "most" or "majority" should be defined as "more than 75%." As indicated above, the Summary does not mention the "more than 75%" requirement. Instead, it notes that "the area of contact or intersection (if it exists) between *the majority* of the elements forming the antenna is only a fraction of the perimeter or surrounding area." *Id*. at 2:60–67 (emphasis added). The Summary further states that the perimeter characteristic exists in the "majority" or in "most" of the polygons. *Id*. at 3:34–38 (describing the "main characteristic of multilevel antennae" as follows: "In multilevel geometry *most* of these elements are clearly visible as their area of contact, intersection or interconnection (if these exist) with other elements is always less than 50% of their perimeter.") (emphasis added), *id.* at 3:8–11 ("[I]t remains possible to identify in the antenna *majority* of basic elements . . . .") (emphasis added).

In other words, the Summary focuses on the requirement that the "majority" or "most" of the geometric elements can be identified, because those geometric elements have less than 50% of their perimeter or area in contact or overlap with another element. *See Microsoft Corp. v. Multi-Tech Sys.*, 357 F.3d 1340, 1348 (Fed. Cir. 2004) (noting that statements in the "Summary of the Invention" are more likely to describe the invention than a preferred embodiment). Furthermore, the specification indicates that the patentees used the term "most" and "majority" interchangeably, and there is no indication that the patentees intended to define either one to mean "more than

75%." Indeed, the plain and ordinary meaning of "majority" is more than 50%. (*See* Dkt. No. 77-5 at 4; Dkt. No. 77-6 at 4.)

Defendants contend that specification describes the defining attributes of the "present invention" to include "at least 75%." (Dkt. No. 82 at 3 (citing '432 Patent at 4:51–5:1).) The portion of the specification quoted by Defendants is included in the "Description of the Preferred Embodiment of the Invention." While certain embodiments in the specification specify that 75% of the geometric elements are configured with the majority of their perimeter free of contact, the requirement of 75% is not mandatory in every instance. In particular, the Summary does not mention the "at least 75%" requirement. Instead, it only requires that a "majority" or "most" of the elements exhibit this characteristic. *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004) ("Even when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction.") (quotations omitted).

Moreover, the preferred embodiment also notes that "at least most" of the component elements are individually identifiable when discussing certain examples, such as those provided in Figure 4. '432 Patent at 5:36–38 ("Note that the component elements are always individually identifiable (at least *most* of them are).") (emphasis added), *id.* at 4:66–5:1 ("[I]n a multilevel structure it is easy to identify geometrically and individually distinguish *most* of its basic component elements.") (emphasis added). Thus, even the preferred embodiments do not uniformly require "more than 75%."

Defendants also argue that the prosecution history indicates that the patentees admitted that "at least 75% of the polygons or polyhedrons . . . is deliberate, given that it is precisely in this

manner how the multilevel antenna that has all the operating functions sought is attained." (Dkt. No. 77-12 at 8–9.) The Court finds that this single statement was not a disclaimer or surrender of claim scope, because the patentees did not distinguish the prior art based on the statement. Instead, the patentees admitted that the prior art included this limitation, but argued that it was "not deliberate" in the prior art. Specifically, the patentees argued that "in the Sierpinski triangle the contact zone between the elements is less than 50% of the perimeter or area in at least 75% of the polygons or polyhedrons, but, however, this level of contact between elements is *not deliberate*." (Dkt. No. 77-12 at 8 (emphasis added).)

Moreover, the claims pending in the PCT application included the "at least 75%" requirement. Thus, the "more than 75%" requirement was an explicit limitation of the then-pending claims, and was not a limitation on the operation of "the invention." In contrast to the PCT claims, the "at least 75% requirement" is not recited in the Asserted Claims filed in the continuing applications. *Hakim v. Cannon Avent Grp., PLC*, 479 F.3d 1313, 1317 (Fed. Cir. 2007) ("It is recognized that an applicant can broaden as well as restrict his claims during the procedures of patent examination, and that continuing applications may present broader claims than were allowed in the parent.").

Finally, Defendants point to a statement by the examiner during the '432 Reexam. The Court is not persuaded that it should adopt the examiner's construction. Like Defendants, the examiner cited to the preferred embodiment disclosed in the specification. (Dkt. No. 82-2 at 7 ("To the extent this feature is not claimed, it appears essential to the definition as it is the very reason behind the name multilevel. Col. 2 lines 44–55, 60–64.").) As discussed above, this is only one embodiment, and Defendants have not provided a persuasive reason to impose this requirement in every claim. Accordingly, the Court rejects Defendants' construction. Finally, in reaching its

conclusion, the Court has considered the extrinsic evidence submitted by the Parties, and given it its proper weight in light of the intrinsic evidence.

3. Court's Construction

For the reasons set forth above, the Court construes the terms **"multilevel structure"** and **"structure for the multi-band antenna"** to mean **"a structure for an antenna useable at multiple frequency bands with at least two levels of detail, wherein one level of detail makes up another level. These levels of detail are composed of polygons (polyhedrons) of the same type with the same number of sides (faces) wherein most of the polygons (polyhedrons) are clearly visible and individually distinguishable and most of the polygons (polyhedrons) having an area of contact, intersection or interconnection with other elements (polygons or polyhedrons) that is less than 50% of the perimeter or area."**

B. "antenna element having a multi-band behavior"

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"antenna element having a multi-band behavior"	"an antenna element useable at more than one frequency band"	Same as its proposal for "multilevel structure"

1. The Parties' Positions

The Parties dispute whether the "antenna element" should be construed the same as the previous term "multilevel structure." Plaintiff argues that the plain language of the claims should apply. (Dkt. No. 77 at 9.) Plaintiff contends that there is no requirement that each claim must cover all features and characteristic of multilevel designs. (*Id.*) According to Plaintiff, the claims of the '069 and '421 Patent reflect an intent to claim some of the inventive concepts separately from the specific multilevel geometry covered in other MLV claims. (*Id.*) Plaintiff further argues that Defendants' proposal would add the "75% requirement" to Claim 1 of the '421 Patent, even though the limitation is specifically added in dependent Claim 4. (*Id.*) Plaintiff contends that it is improper

to limit all claims to a multilevel geometry, especially when limiting the claims would render a dependent claim superfluous. (*Id.* at 9–10.)

Defendants respond that it is clear from the specification that the multilevel structure is the quintessence of the alleged invention. (Dk. No. 82 at 6 (citing '432 Patent at Abstract, 4:51–53.) Defendants argue that the specification explains that it is the multilevel geometry that distinguishes the alleged invention from the prior art, which could attain multiband performance without a multilevel structure. (*Id.* (citing '432 Patent at 4:60–66.) Defendants contend that Plaintiff points to nothing in the specification that supports its argument that the alleged invention could provide multiband performance and distinguish the prior art without a multilevel structure. (*Id.*) According to Defendants, Plaintiff does not explain how such claims could comply with the written description requirement, 35 U.S.C. §112, ¶ 1, if they are not construed to include a multilevel structure. (*Id.*) Finally, Defendants argue that Plaintiff's claim differentiation is "weak and ineffective." (*Id.*)

Plaintiff replies that the Asserted Claims of the '069 and '421 Patents are specifically drawn to an antenna design constructed of geometric elements arranged in a specific manner to define multiple winding current paths. (Dkt. No. 85 at 4 (citing '069 Patent at Claim 32; '421 Patent at Claim 1).) Plaintiff contends that if Defendants believe the claims are unsupported under 35 U.S.C § 112, ¶ 1, the proper vehicle to attack the claims is under that provision, not by ignoring the plain language of the claims. (*Id.*)

For the following reasons, the Court finds that the term **"antenna element having a multi-band behavior"** should be construed to mean **"a structure for an antenna useable at multiple frequency bands with at least two levels of detail, wherein one level of detail makes up another level. These levels of detail are composed of polygons (polyhedrons) of the same type**

with the same number of sides (faces) wherein most of the polygons (polyhedrons) are clearly visible and individually distinguishable and most of the polygons (polyhedrons) having an area of contact, intersection or interconnection with other elements (polygons or polyhedrons) that is less than 50% of the perimeter or area."

2. Analysis

The term "antenna element having a multi-band behavior" appears in Asserted Claims 32 and 46 of the '069 Patent; and Asserted Claims 1 and 11 of the '421 Patent. The Court finds that the term is used consistently in the claims and is intended to have the same general meaning in each claim. In these claims, the coined term "multilevel structure" was replaced with the disputed term "antenna element having a multi-band behavior." Defendants argue that this was an attempt to broaden the claims beyond the written description of the original patent application. As indicated above, however, the Court notes that it is not improper to broaden claims in a continuing application. Nevertheless, "[w]hen a patent thus describes the features of the 'present invention' as a whole, this description limits the scope of the invention." *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1308 (Fed. Cir. 2007), *see also Andersen Corp. v. Fiber Composites, LLC*, 474 F.3d 1361, 1368 (Fed. Cir. 2007) (finding the specification's description of a "critical element" limiting).

Here, the specification repeatedly emphasizes that the "essence of the invention is found in the geometry used in the multilevel structure . . . ." '432 Patent at 6:3–4; *see also id.* at 5:46–48 ("It should be remarked that the difference between multilevel antennae and other existing antennae lies in the particular geometry . . . ."), 2:44–45 ("The present invention consists of an antenna whose radiating element is characterised by its geometrical shape . . . ."), 3:52–53 ("Multilevel antennae on the contrary base their behavior on their particular geometry . . . ."),

5:25–28 ("With this it should be remarked that regardless of its configuration the multilevel antenna is different from other antennae in the geometry of its characteristic radiant element."), 5:62–65 ("In all, the difference between a multilevel antenna and a conventional one lies in the geometry of the radiative element or one of its components, and not in its specific configuration."). As indicated, the "geometry" disclosed in the specification is the "main characteristic of [the] multilevel antenna." '432 Patent at 3:30–44. However, this "geometry" is not explicitly recited in the claims. Accordingly, the Court finds that "antenna element having a multi-band behavior" should be construed the same as "multilevel structure."

Plaintiff argues that there is no requirement that each claim must cover all features and characteristic of multilevel designs. (Dkt. No. 77 at 9.) According to Plaintiff, the choice of different words gives rise to the presumption that the different claims have a different scope. Although this is generally true, the law is clear that the "[c]laims are not interpreted in a vacuum, but are part of and are read in light of the specification." *Slimfold Mfg. Co. v. Kinkead Indus., Inc.*, 810 F.2d 1113, 1116 (Fed. Cir. 1987). Here, the specification clearly indicates the required features of the "present invention." *Broadcom Corp. v. Qualcomm Inc.*, 543 F.3d 683, 692–93 (Fed. Cir. 2008) (holding that the specification as a whole may serve to limit the claims by repeatedly characterizing the invention in a specific manner).

Plaintiff also argues that dependent Claim 4 of the '421 Patent adds that the requirement that "for at least 75% of the geometric elements, the region or area of contact between the geometric elements is less than 50% of the perimeter or area of the geometric elements." (Dkt. No. 77 at 9.) As discussed above, the Court finds that this is only a preferred embodiment, and is not a required limitation. Accordingly, this argument is moot.

3. Court's Construction

For the reasons set forth above, the Court construes the term **"antenna element having a multi-band behavior"** to mean **"a structure for an antenna useable at multiple frequency bands with at least two levels of detail, wherein one level of detail makes up another level. These levels of detail are composed of polygons (polyhedrons) of the same type with the same number of sides (faces) wherein most of the polygons (polyhedrons) are clearly visible and individually distinguishable and most of the polygons (polyhedrons) having an area of contact, intersection or interconnection with other elements (polygons or polyhedrons) that is less than 50% of the perimeter or area."**

C. "majority of the geometric elements"

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"majority of the geometric elements"	"more than 50% of the geometric elements"	"at least 75% of the geometric elements"

1. The Parties' Positions

The Parties dispute whether majority means "more than 50%," as Plaintiff contends, or if it means "at least 75%," as Defendants contend. Plaintiff argues that the plain and ordinary meaning of "majority" is more than 50%. (Dkt. No. 77 at 10 (citing Dkt. No. 77-5; Dkt. No. 77-6.) According to Plaintiff, when the Asserted Patents use the word "majority," they use the word in its plain and ordinary sense. (*Id.* (citing '432 Patent at 2:60–64).) Plaintiff contends that the description of one embodiment does not rise to the level of a clear disavowal of claim scope. (*Id.* (citing '432 Patent at 4:63–66).) Plaintiff argues that the patentees specifically rejected the argument that this passage represented a disclaimer during reexam. (*Id.* at 10–11 (citing Dkt. No. 77-9 at 23).) Plaintiff also contends that Claim 4 of the '421 Patent recites "for at least 75% of the geometric elements," while Claim 5 (which depends from the same claim) recites "for a majority of the geometric elements." (*Id.* at 11.)

Defendants respond that "majority" must be construed to mean at least 75% of the geometric elements for the same reason that "most" must be construed that way. (Dkt. No. 82 at 7.) According to Defendants, the specification clearly teaches at least 75% of geometric elements have less than 50% of their perimeters in contact with other geometric elements. (*Id.*) Defendants contend that Plaintiff used "majority" because 75% is a majority. (*Id.*) Defendants argue that Plaintiff cannot retroactively change the meaning of the term as dictated by the inventors' lexicography in the specification. (*Id.*)

Plaintiff replies that Defendants' citation to a particular embodiment in the specification does not rise to the level of "manifest exclusion or restriction" required for disclaimer, especially given other specification passages. (Dkt. No. 85 at 4 (citing *Thorner v. Sony Comp. Entertainment*, 669 F.3d 1362, 1366 (Fed. Cir. 2012)).) Plaintiff argues that Defendants fail to address that its proposed construction ignores the distinction between the language of '421 Patent Claims 4 and 5. (*Id.*) According to Plaintiff, the '421 Patent does not claim a multilevel structure; indeed, it claims "an antenna element having a multi-band behavior." (*Id.*) Plaintiff argues that for Defendants' construction to be correct, the specification must demonstrate a clear disavowal. (*Id.*)

For the following reasons, the Court finds that the phrase **"majority of the geometric elements"** should be construed to mean **"more than 50% of the geometric elements."**

2. Analysis

The phrase "majority of the geometric elements" appears in Asserted Claim 5 of the '421 Patent. The Court finds that the specification does not define "majority" to mean "at least 75%." Moreover, the plain and ordinary meaning of "majority" is more than 50%. (*See* Dkt. No. 77-5 at 4; Dkt. No. 77-6 at 4.) Accordingly, the Court finds that "majority" means "more than 50%."

Defendants repeat their argument from the previous terms and contend that "[t]he specification, written and filed in 1999, clearly teaches at least 75% of geometric elements have less than 50% of their perimeters in contact with other geometric elements." (Dkt. No. 82 at 7.) For the reasons discussed above, the Court finds that the patentees did not define "majority" to mean "at least 75%." The language Defendants point to in the specification only describes one embodiment. This description does not rise to the level of "manifest exclusion or restriction" to represent a clear disavowal of claim scope. *See Thorner*, 669 F.3d at 1366. Finally, in reaching its conclusion, the Court has considered the extrinsic evidence submitted by the Parties, and given it its proper weight in light of the intrinsic evidence.

3. Court's Construction

For the reasons set forth above, the Court construes the phrase **"majority of the geometric elements"** to mean **"more than 50% of the geometric elements."**

D. "level of structural detail" / "levels of detail"

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"level of structural detail"/"levels of detail"	"the overall antenna and the geometric elements which form it"	"a level of structure in the multilevel structure that is clearly identifiable from another level of structural detail"

1. The Parties' Positions

The Parties dispute whether the phrase "level of structural detail" should require: (1) the structure to be "clearly identifiable"; and (2) the structure is clearly identifiable "from another level of structural detail." Plaintiff argues that the Asserted Patents describe the claimed "multilevel" antenna structures as comprising two levels of structural detail: the overall antenna and the geometric elements that form it. (Dkt. No. 77 at 11 (citing '432 Patent at 2:35–43, 2:60–64).) Plaintiff states that it does not dispute that the levels of detail must be "identifiable." (*Id.*)

Instead, Plaintiff argues that Defendants' construction imports the additional requirement that the levels of detail are "clearly identifiable." (*Id.*) Plaintiff further argues that Defendants' construction requires something more than the ability to identify the levels of detail without explaining what this additional language means. (*Id.* at 12.) According to Plaintiff, the "clearly identifiable" requirement exists already in the claims of the '432, '431 and '632 Patents for most of the geometric elements that form the claimed "multilevel structure." (*Id.*) Plaintiff contends that nothing in the intrinsic record suggests anything more than that elements "can be identified." (*Id.* (citing '432 Patent at 2:60–64).)

Defendants respond that there are two aspects to their construction: "clearly identifiable" and "from another level of structural detail." Defendants argue that the specification teaches both of these aspects. (Dkt. No. 82 at 8 (citing '432 Patent at 2:38–41, 3:30–38).) Defendants also argue that their construction is consistent with a conclusion in the prior claim construction order. (*Id.* (citing Dkt. No. 77-3 at 15).) Defendants contend that Plaintiff is asking the Court to set aside the teachings in the specification that "clearly visible" is a main characteristic of the purported invention. (*Id.*)

Defendants further argue that their proposed "from another level of structural detail" aspect appears in claims that call for "a first level of structural detail" and "a second level of structural detail." (*Id.* at 9 (citing '431 Patent at Claim 14).) According to Defendants, the first level must be clearly identifiable from the second level in order to have two levels. (*Id.*) Defendants argue that if the levels are the same, then there is only one level. (*Id.*)

Plaintiff replies that Defendants' construction is redundant and unnecessary for the Asserted Claims that include the term "clearly identifiable." (Dkt. No. 85 at 5.) Plaintiff states that it agrees that the first and second "levels of detail" must be different from one another. (*Id.*)

Plaintiff argues that this is why its construction requires that the "levels of detail" consist of two different things: (1) "the overall antenna" and (2) "the geometric elements which form it." (*Id.*)

For the following reasons, the Court finds that the term **"first level of structural detail"** should be construed to mean **"detail that clearly shows the overall structure,"** and that the term **"second level of structural detail"** should be construed to mean **"detail that clearly shows most of the individual elements."** The Court further finds that the phrase **"two levels of details"** should be construed to mean **"a first level of detail that clearly shows the overall structure, and a second level of detail that clearly shows most of the individual elements."**

2. Analysis

The terms "first level of structural detail" and "second level of structural detail" appear in Asserted Claim 6 of the '432 Patent; and Asserted Claims 14 and 30 of the '431 Patent. The Court finds that the terms are used consistently in the claims and are intended to have the same general meaning in each claim. The phrase "two levels of details" appears in Asserted Claim 17 of the '632 Patent. The Parties proposed construing only the terms "level of structural detail" and "levels of detail." The Court finds that only construing these terms creates more confusion than clarity, because it ignores the context of the surrounding claim language. For example, Claim 6 of the '432 Patent recites the following:

> 6. The multi-band antenna set forth in claim 1, wherein said antenna is included in a portable communications device wherein:
>
> > the first portion is *a first level of structural detail* comprising the overall structure and having a first geometry configured to operate at the first selected frequency band;
> >
> > the second portion is *a second level of structural detail* within *the first level of structural detail*, the second portion being smaller than the first portion and having a second geometry configured to operate at the second selected frequency band; and

> the perimeter of the multilevel structure has a different number of sides than each of the geometric elements that compose the multilevel structure.

As indicated, Claim 6 recites two different levels of structural details, a first level and a second level.[4] The claim also recites the relationship between the first level of structural detail and the second level of structural detail. Thus, the Court finds that construing only the term "level of structural detail" would be incomplete and confusing, because it muddles the claim language of a distinct first level and a distinct second level. Accordingly, the Court will provide a construction for both the "first level of structural detail" and the "second level of structural detail."

Turning to the specification, the Summary of the Invention ("Summary") states the following:

> Although they are not fractal, multilevel antennae *are characterised in that they comprise a number of elements which may be distinguished in the overall structure*. Precisely because *they clearly show several levels of detail (that of the overall structure and that of the individual elements which make it up),* antennae provide a multiband behavior and/or a small size. The *origin of their name* also lies in said property.

'432 Patent at 2:36–43 (emphasis added). As the Summary states, the ability to "clearly show several levels of detail" is the "origin" of the coined term "multilevel." Indeed, the specification states that "levels of detail" include clearly showing "the overall structure and that of the individual elements which make it up." *Id.* at 2:36–43. The specification further adds that a "main characteristic of [a] multilevel antennae" is that polygons elements are "electromagnetically coupled and grouped to form a larger structure," and that "*most of these elements are clearly visible*." *Id.* at 3:33–38 (emphasis added).

[4] Claim 17 of the 632 Patent does not recite a "first level of structural detail" and a "second level of structural detail." Instead, claim 17 recites "the at least one structure including at least *two levels of detail*, wherein one level of detail makes up another level of detail, the at least *two levels of detail* being composed of closed figures bounded by the same number of sides." As indicated above, the two levels of details refer to the overall structure and the individual elements.

In describing one embodiment, the specification states that Figure 4 illustrates "multilevel structures (4.1–4.14) formed by parallelepipeds (squares, rectangles, rhombi . . .). Note that the component elements are always individually identifiable (*at least most of them are*)." *Id.* at 5:35–38 (emphasis added). Thus, the intrinsic evidence indicates that the first "first level of structural detail" is the "detail that clearly shows the overall structure," and that the "second level of structural detail" is the "detail that clearly shows most of the individual elements."

Plaintiff contends that some of the Asserted Claims already include the term "clearly identifiable," thus making the construction redundant and unnecessary. (Dkt. No. 85 at 5.) Plaintiff argues that for other claims that do not include "clearly identifiable," it would be legal error to include this limitation. To the extent that Plaintiff argues that "level of structural detail" does not require clearly showing the overall structure or most of the individual elements, the Court disagrees. As discussed above, the specification repeatedly emphasizes that the "essence of the invention is found in the geometry used in the multilevel structure." '432 Patent at 6:3–4, *see also id.* at 2:44–45 ("The present invention consists of an antenna whose radiating element is characterised by its geometrical shape . . . ."). Indeed, the specification states that the "level of detail" is the origin of the name "multilevel." *Id.* at 2:42–43. Accordingly, the Court rejects Plaintiff's argument. *Broadcom Corp. v. Qualcomm Inc.*, 543 F.3d 683, 692–93 (Fed. Cir. 2008) (holding that the specification as a whole may serve to limit the claims by repeatedly characterizing the invention in a specific manner).

Defendants propose the additional limitation of "from another level of structural detail." Defendants argue this limitation is important for the claims that recite "a first level of structural detail" and "a second level of structural detail." (Dkt. No. 82 at 12.) Defendants contend "[t]he first level must be clearly identifiable from the second level in order to have two levels." (*Id.*) The

Court does not disagree, but finds that the proper means to clarify this issue is to construe the terms "first level of structural detail" and "second level of structural detail." Both the claims in the '432 and '431 Patents, as well as the Court's constructions, explicitly recite that the "first level of detail" is the "overall structure." Thus, the Court rejects this specific language in Defendants' construction.

3. Court's Construction

For the reasons set forth above, the Court construes the term **"first level of structural detail"** to mean **"detail that clearly shows the overall structure,"** and the term **"second level of structural detail"** to mean **"detail that clearly shows most of the individual elements."** The Court also construes the phrase **"two levels of details"** to mean **"a first level of detail that clearly shows the overall structure, and a second level of detail that clearly shows most of the individual elements."**

E. "geometric element" / "polygon"

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"geometric element" / "polygon"	"a closed plane figure bounded by straight sides, further including circles and ellipses, where a portion of a circle or ellipse is counted as one side"	"a closed plane figure bounded by straight lines or closed plane bound by a circle or an ellipse"

1. The Parties' Positions

The Parties dispute whether the "geometric element" may include both a "straight line" and a "circle/ellipse." Plaintiff argues that its construction embraces the constructions adopted in the prior litigation. (Dkt. No. 77 at 12–13.) Plaintiff contends that the specification teaches that the geometric elements used to construct the claimed antennas may include curved sides. (*Id.* at 13) (citing '432 Patent at 2:47–55, 4:53–60.) Plaintiff further argues that the specification includes examples of antenna structures that include both flat and curved sides. (*Id.* (citing '432 Patent at

Figure 7.8).) Plaintiff also contends that the specification notes that a multilevel structure may be used as the reflector in a reflector (or satellite dish) antenna, or the conical section or walls of a horn antenna. (*Id.* (citing '432 Patent at 3:58–61, 5:53–59, 6:11–14).) According to Plaintiff, in these applications the sides of the polygons are curved to fit the non-planar surfaces in a reflector dish antenna and a conically shaped antenna. (*Id.* at 13–14.) Plaintiff also argues that the specification teaches that a multilevel structure may be applied to a spiral antenna. (*Id.* at 14 (citing'432 Patent at 6:5–21).) Plaintiff contends that the geometric elements of a multilevel structure applied to a spiral antenna will also exhibit some curved sides. (*Id.*)

Plaintiff next argues that many of the MLV Patents explicitly claim antennas that mix flat and curved sides. (*Id.* at 15 (citing '432 Patent at Claim 3; '431 Patent at original Claim 5; '432 Patent at original Claim 2; '541 Patent at Claim 8; '421 Patent at Claim 8; '069 Patent at Claims 25, 26).) Plaintiff contends that these claims confirm that a geometric element may have straight perimeter portions, curved perimeter portions, or both. (*Id.*) Plaintiff further argues that the parent patents to the asserted patents also included claims covering hybrid geometric elements with both curved and straight sides. (*Id.* (citing '208 Patent at Claims 4, 5, 17, 20 (Dkt. No. 77-8); '868 Patent at Claims 11, 12 (Dkt. No. 77-7); PCT App. at Claims 4, 9 (Dkt. No. 77-12)).)

Defendants respond that this term is inextricably linked with the coined term "multilevel structure." (Dkt. No. 82 at 10.) Defendants argue that the specification describes with particularity the type of geometric elements that are part of a multilevel structure. (*Id.* (citing '432 Patent at 2:44–50, 4:51–58).) Defendants contend that triangles, squares, pentagons and hexagons are polgyons, which by definition have straight sides. (*Id.* at 11 (citing Dkt. No. 82-4).) According to Defendants, the specification never states that a polygon can be replaced with a closed plane figure

having a curved side formed by part of a circle or ellipse. (*Id.*) Defendants further argue that none of the 56 embodiments in Figures 1–6 depict a closed plane figure with a curved side. (*Id.*)

Regarding Figure 7.8, Defendants argue that a cylinder is just a number of circles stacked one on top of the other. (*Id.*) According to Defendants, the "curved" surface in Fig. 7.8 is just a stack of circles, and the specification defines the circle as a limiting case for a polygon with a large number of sides. (*Id.*) Defendants argue that none of the polyhedrons in Fig. 7 is formed of closed planar figures having a mixture of straight and curved sides. (*Id.*) Defendants also argue that none of the 64 figures in the patent looks anything like Plaintiff's demonstratives. (*Id.* at 12.) Defendants contend that Plaintiff's demonstratives should be disregarded because there is no expert testimony or other extrinsic evidence that provides support for them. (*Id.*)

Defendants further contend that Plaintiff largely relies on claims that were drafted after the original specification was filed. (*Id.*) Defendants argue that Plaintiff's citation to original Claims 4 and 9 do not support its argument. (*Id.*) Defendants contend that Claim 4 concerns a multilevel structure "formed exclusively by polyhedrons, cylinders and cones." (*Id.*) Defendants also argue that Claim 9 states that "the multilevel structure or its perimeter for the cross-section of a conical or pyramidal horn type antenna." (*Id.* at 12.)

Plaintiff replies that Defendants concede that the ordinary definition of "polygon" does not apply, because the correct construction of these terms must encompass circles and ellipses. (Dkt. No. 85 at 5.) Plaintiff argues that the claims of the parent '868 Patent provide "substantial guidance" regarding the meaning of "geometric element" and "polygon." (*Id.* at 5–6 (citing '868 Patent at Claims 11, 12 (Dkt. No. 77-7); PCT App. at Claim 4, 9 (Dkt. No. 77-12)).) Plaintiff argues that the disclosure of cylinders and cones as polyhedrons provides support for figures that include both curved and straight sides on flat and curved portions. (*Id.* at 6 (citing '432 Patent at

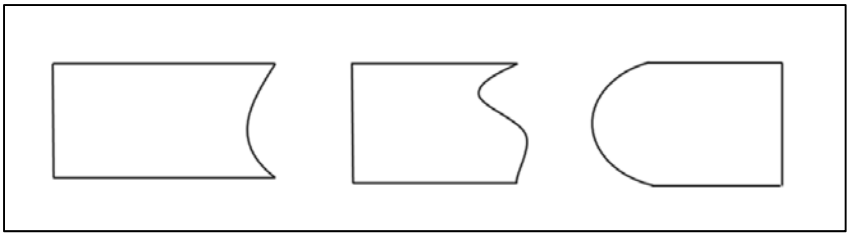
4:26–27, Figure 7.8).) Plaintiff further argues that in 2006, the examiner allowed claims in the '208 Patent that explicitly claim embodiments with hybrid polygons consisting of portions of circles or ellipses and figures with both curved and straight sides. (*Id.* (citing '208 Patent at Claims 4, 17, 39, 62 (Dkt. No. 77-8)).) According to Plaintiff, these claims provide "highly instructive" context regarding the meaning of "polygon." (*Id.* (citing *Phillips*, 415 F.3d at 1314).)

For the following reasons, the Court finds that the terms **"geometric element"** and **"polygon"** should be construed to mean **"a closed plane figure bounded by straight sides, further including circles and ellipses, where a portion of a circle or ellipse is counted as one side."**

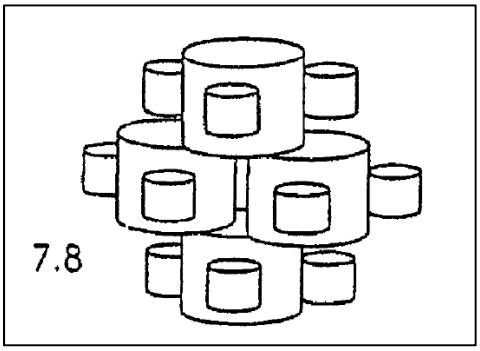
2. Analysis

The term "geometric element" appears in Asserted Claims 1, 14, and 30 of the '431 Patent; Asserted Claims 1 and 6 of the '432 Patent; Asserted Claims 32 and 46 of the '069 Patent; Asserted Claims 1, 5–7, and 10 of the '421 Patent; Asserted Claim 17 of the '541 Patent; and Asserted Claim 17 of the '617 Patent.[5] The Court finds that the term is used consistently in the claims and is intended to have the same general meaning in each claim. The Parties agree that the "geometric element" may be a closed plane bounded by straight lines. The Parties dispute whether the closed plane may be bounded by both straight lines and a circle or ellipse, as shown below:

[5] The Parties agree that the term "polygon" should be construed the same as the term "geometric element." The Parties note that the term "polygon" is not recited in the Asserted Claims, but is implicated in construction of the term "multilevel structure." (Dkt. No. 77 at 12, Dkt. No. 82 at 10).



(Dkt. No. 82 at 11.) Defendants argue that nothing in the written specification describes these shapes, and none of the 56 embodiments in Figures 1–6 depict a closed plane figure with a curved side. (*Id.*) Defendants are correct that the specification does not include the cross sections illustrated above. However, the specification does identify "circles and ellipses as a limiting case of a polygon with a large number of sides." '432 Patent at 2:48–49. As the court found in the prior litigation, "[b]y including circles and ellipses as an explicit 'limiting case' of polygon, the MLV specification supports a construction of polygons to include circles and ellipses, *i.e.* figures with curved sides." (Dkt. No. 77-10 at 5.) And although the specification does not include the exact shapes illustrated above, the specification does include figures that are described as polyhedron that include both flat and curved portions. Specifically, Figure 7.8 depicts a "hybrid" polyhedron that includes cylinders with curved and flat surfaces:



'432 Patent at Figure 7.8. In addition, many of the MLV Patents explicitly claim antennas that mix flat and curved sides. For example, claims in the '432 Patent recite a "plurality of geometric elements" that include "both linear and non-linear portions." '432 Patent at Claim 3; *see also* '431 Patent at original Claim 5 ("perimeter regions comprising both linear and non-linear portions.");

'432 Patent at original Claim 2 ("at least some of the plurality of geometric elements have perimeter regions comprising a curve.").

The parent patents also included claims covering hybrid geometric elements with both curved and straight sides. For example, the '208 Patent claimed embodiments with polygons consisting of *portions* of circles or ellipses, i.e., figures with curved and straight sides. '208 Patent at Claim 4 ("perimeter regions comprising portions of circles or ellipses"), Claim 5 (both linear and non-linear perimeter portions), Claim 17 (at least one side comprises a portion of a circle or ellipse), Claim 20 (at least one nonlinear portion formed of a portion of a circle or ellipse and other perimeter portions are linear) (Dkt. No. 77-8.) Similarly, claims 11 and 12 of the '868 Patent include a multilevel structure formed by cylinders and cones, as disclosed in the specification. '868 Patent at Claims 11, 12 (Dkt. No. 77-7); *see also* PCT App. at Claims 4, 9 (Dkt. No. 77-12.) Accordingly, the intrinsic evidence indicates that a geometric element may have straight perimeter portions, curved perimeter portions, or both. Thus, the term "geometric element" should be construed to include hybrid shapes with both curved and straight sides.

Defendants argue that Plaintiff's reliance on the cylindrical-shaped polyhedrons in Figure 7.8 is misplaced, because a cylinder is just a number of circles stacked one on top of the other. (Dkt. No. 82 at 14.) Defendants contend that none of the polyhedrons in Figure 7 is formed of closed planar figures having a mixture of straight and curved sides. (*Id.*) Defendants are correct that Figure 7.8 illustrates cylinders, but that does not preclude the "geometric element" from including both curved and straight sides. Moreover, Defendants do not address the claims in the '432 Patent and the '208 Patent that recite "both linear and non-linear perimeter portions." Accordingly, the Court rejects Defendants' construction that requires a closed plane figure bounded by either a straight lines or a circle or an ellipse. Finally, in reaching its conclusion, the

Court has considered the extrinsic evidence submitted by the Parties, and given it its proper weight in light of the intrinsic evidence.

3. Court's Construction

For the reasons set forth above, the Court construes the terms **"geometric element"** and **"polygon"** to mean **"a closed plane figure bounded by straight sides, further including circles and ellipses, where a portion of a circle or ellipse is counted as one side."**

F. "a set of closed figures bounded by the same number of sides, the sides comprising one or more of straight lines, portions of circles and portions of ellipses"

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"a set of closed figures bounded by the same number of sides, the sides comprising one or more of straight lines, portions of circles and portions of ellipses"	No construction necessary; alternatively, "closed figure" means "a figure that begins and ends at the same point"	"a set of straight-side polygons bounded by the same number of straight sides, or a set of figures each figure bound by a circle, or a set of figures each bound by an ellipse"

1. The Parties' Positions

The dispute is essentially the same as the previous term, which is whether the "closed figure" may include both a "straight line" and a "circle and/or ellipse." Plaintiff argues that the MLV specification notes that an antenna structure may be used as the reflector in a reflector (or satellite dish) antenna or on the walls of a conical antenna. (Dkt. No. 77 at 16 (citing '432 Patent at 3:58–61, 5:53–59, 6:11–14).) According to Plaintiff, in this embodiment the sides of the elements used to construct the antenna are curved to fit the non-planar or curved surfaces of an antenna, and thus one or more sides of the elements may be curved to conform to the reflector, conical or spiral antenna surface, which are either elliptical or circular in shape. (*Id.*)

Plaintiff also argues that the originally-filed claims in the priority document cover "the multilevel structure or its perimeter form the cross section of a conical or pyramidal horn type

antenna." (*Id.* (citing PCT App. at Claim 9 (Dkt. No. 77-12)).) Plaintiff contends that the claims of the '208 Patent recited "at least some polygons include at least one non-linear perimeter formed of a portion of a circle or ellipse and wherein other polygon perimeters are linear." (*Id.* at 17 (citing '208 Patent at Claim 3, 4, 5, 36, 39, 48).) Plaintiff further argues that Claim 17 of the '632 Patent requires a set of closed figures bounded by the same number of sides, with the sides including one or more of straight lines, portions of circles, or portions of ellipses. (*Id.*) Plaintiff also argues that the ordinary meaning of "closed figure" is "a shape or a curve that begins and ends at the same point." (*Id.* (citing Dkt. No. 77-13).) According to Plaintiff, the intrinsic evidence uniformly shows geometric elements as figures that begin and end at the same point. (*Id.*)

Defendants respond that the only closed figures supported by the specification are the geometric elements previously construed to be polygons (or polyhedrons) in the prior litigation. (Dkt. No. 82 at 13 (citing Dkt. No. 77-3 at 13–14, 21–23).) Defendants argue that if the claim limitation covers a non-polygon shapes with a curved side (i.e., a portion of a circle or ellipse), then the claim is invalid because there is no written description to support the limitation. (*Id.*)

Finally, Defendants argue that Plaintiff relies on a *Visual Mathematics Dictionary*, which Defendants contend appears to be a screenshot from an illustrated online dictionary designed for children. (*Id.* at 14.) Defendants further contend that there is no evidence that it was available at the time of the alleged invention, or that a person of ordinary skill would consider a children's online dictionary in construing the claim. (*Id.*)

Plaintiff replies that Defendants are effectively asking the Court to render summary judgment on a fact question without submitting supporting evidence or expert testimony. (Dkt. No. 85 at 7.) Plaintiff argues that the specification provides ample support for figures with both

straight and curved sides, including reflector antennas, conical antennas, cylindrical antennas, and spiral antennas. (*Id.*)

For the following reasons, the Court finds that the phrase **"a set of closed figures bounded by the same number of sides, the sides comprising one or more of straight lines, portions of circles and portions of ellipses"** should be given its **plain and ordinary meaning.**

2. Analysis

The phrase "a set of closed figures bounded by the same number of sides, the sides comprising one or more of straight lines, portions of circles and portions of ellipses" appears in Asserted Claim 17 of the '632 Patent. Unlike the previous term, the disputed phrase explicitly recites that "the sides comprising one or more of straight lines, portions of circles and portions of ellipses." Defendants argue that Plaintiff is attempting to use different words in a later filed continuation to try and broaden the claim beyond what is supported by the specification. (Dkt. No. 82 at 16). As discussed above, the Court notes that it is not improper to broaden claims in a continuing application. *Hakim v. Cannon Avent Grp., PLC*, 479 F.3d 1313, 1317 (Fed. Cir. 2007) ("It is recognized that an applicant can broaden as well as restrict his claims during the procedures of patent examination, and that continuing applications may present broader claims than were allowed in the parent.").

Defendants next argue that if the claim limitation covers a non-polygon shapes with a curved side (*i.e.*, a portion of a circle or ellipse), then the claim is invalid under 35 U.S.C. § 112, ¶ 1, because there is no the written description to support the limitation. (Dkt. No. 82 at 16) (citing *Ruckus Wireless, Inc. v. Innovative Wireless Sols., LLC*, 824 F.3d 999, 1004 (Fed. Cir. 2016)). Unlike the facts in this case, the court in *Ruckus* concluded "that no intrinsic or extrinsic evidence suggests that 'communications path' encompasses wireless communications." *Ruckus*, 824 F.3d

at 1004. Here, the intrinsic evidence confirms that the "closed figure" may include both a "straight line" and a "circle/ellipse." Indeed, the claim explicitly recites that "the sides" of the closed figures comprise "one or more of straight lines, portions of circles and portions of ellipses." *Renishaw PLC v. Marposs Societa' Per Azioni*, 158 F.3d 1243, 1248 (Fed. Cir. 1998) ("The claims define the scope of the right to exclude; the claim construction inquiry, therefore, begins and ends in all cases with the actual words of the claim."). Accordingly, the Court rejects Defendants' construction. Finally, in reaching its conclusion, the Court has considered the extrinsic evidence submitted by the Parties, and given it its proper weight in light of the intrinsic evidence.

3. Court's Construction

For the reasons set forth above, the phrase **"a set of closed figures bounded by the same number of sides, the sides comprising one or more of straight lines, portions of circles and portions of ellipses"** will be given its **plain and ordinary meaning.**

G. "number of sides"

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"number of sides"	No construction necessary; plain and ordinary meaning applies.	"number of straight sides for geometric elements bounded by straight sides, and a large number for geometric elements bounded by a circle or an ellipse"

1. The Parties' Positions

The Parties' dispute is essentially the same as the previous two terms, which is whether the "number of sides" may include both a "straight line" and a "circle/ellipse." Plaintiff argues that Defendants seek to restrict the claims from covering hybrid figures that include both straight and curved sides. (Dkt. No. 77 at 18.) Plaintiff contends that both the specification and claims from various MLV Patents provide support for geometric elements and figures that include both straight and curved sides. (*Id.* (citing '432 Patent at 5:53–62, 6:11–14; PCT App. at originally-filed Claim

9 (Dkt. No. 77-12); '208 Patent at Claims 3, 4, 5, 17, 20, 32, 36, 39, 48; '432 Patent at Claims 2, 3; '431 Patent at Claim 5; '541 Patent at Claim 8; '421 Patent at Claim 8; '069 Patent at Claims 25, 26).)

Defendants respond that their construction precludes Plaintiff from trying to argue that a side can be a planar figure with a curved side. (Dkt. No. 82 at 14.) Defendants do not present any new arguments for this term, but instead state that the reasons for their construction is "set forth in the previous two sections." (*Id.*)

Plaintiff replies that Defendants offer no argument apart from its arguments about the two preceding terms. (Dkt. No. 85 at 7.) According to Plaintiff, there is no reason to depart from the previous holding that "a person of ordinary skill in the art, reading the specification and claims of the MLV patents would understand that when counting the sides of a polygon, a 'curved side' consisting of a portion of a circle or ellipse should be counted as one side." (*Id.* (citing Dkt. No. 77-10 at 6).)

For the following reasons, the Court finds that the term **"number of sides"** should be given its **plain and ordinary meaning.**

2. Analysis

The term "number of sides" appears in Asserted Claims 14 and 30 of the '431 Patent; Asserted Claim 6 of the '432 Patent; Asserted Claim 46 of the '069 Patent; Asserted Claim 11 of the '421 Patent; and Asserted Claims 17 and 19 of the '632 Patent. The Court finds that the term is used consistently in the claims and is intended to have the same general meaning in each claim. Defendants do not present any new arguments related to this term. Instead, they argue that their construction is necessary to preclude Plaintiff from arguing that a side can be a planar figure with

a curved side. (Dkt. No. 82 at 14.) For the reasons discussed above, the Court rejects Defendants' construction.

The Court further notes that Defendants' construction takes three words and redrafts it as twenty-five words. The Court finds that this is not only unwarranted, but is also unhelpful to the jury. The claim language is clear and addresses the relationship between the number of sides of the multilevel structure and the number of sides for each of the geometric elements. For example, Claim 14 of the '431 Patent recites that "the perimeter of the multilevel structure has *a different number of sides* than each of the geometric elements that compose the multilevel structure." Simply stated, the structure and the elements do not have the same number of sides. This claim language is unambiguous, and is easily understandable by a jury, and should be given its plain and ordinary meaning. Finally, in reaching its conclusion, the Court has considered the extrinsic evidence submitted by the Parties, and given it its proper weight in light of the intrinsic evidence.

3. Court's Construction

For the reasons set forth above, the term **"number of sides"** will be given its **plain and ordinary meaning.**

H. "Substantially within" terms

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"said second [and third] portion[s] being located substantially within the first portion"	"the second [and third] portion[s] share[s] a substantial number of geometric elements with the first portion"	"second [and third] portion[s] being substantially inside or enclosed by the first portion, where the first portion, the second portion, and the third portion differ in size or configuration"
"at least substantial parts of said second and third portions being part of the first portion"	"the second and third portions share a substantial number of geometric elements with the first portion"	"second and third portion[s] being substantially inside or enclosed by the first portion, where the first portion, the second portion, and the third portion differ in size or configuration"
"a [second/third] portion located substantially within the first portion"	"the [second/third] portion shares a substantial number of geometric elements with the first portion"	"a [second/third] portion being substantially inside or enclosed by the first portion, where the first portion, the second portion, and the third portion differ in size or configuration"

1. The Parties' Positions

The Parties dispute whether the term "substantially within" should be construed to mean "share a substantial number of elements," as Plaintiff proposes, or "substantially inside or enclosed," as Defendants propose. The Parties also dispute whether the first portion, the second portion, and the third portion must "differ in size or configuration." Plaintiff argues that "substantially within" requires overlap or sharing of geometric elements between different radiating portions of the antenna structure. (Dkt. No. 77 at 19.) Plaintiff contends that one of the disclosed improvements of the MLV Patents is the ability to design small antennas that radiate at multiple frequency bands. (*Id.* (citing '432 Patent at 2:39–42, 3:16–18).) According to Plaintiff, the size reduction is achieved by sharing portions of the antenna real estate across multiple frequency bands. (*Id.* at 20.)

Plaintiff further argues that during reexamination, the patentees consistently characterized "substantially within" as requiring sharing or overlapping elements. (*Id.* (citing Dkt. No. 77-9 at

3, 7–8, 10, 13, 16).) Plaintiff contends that its construction is taken nearly verbatim from these statements. (*Id.*) Plaintiff argues that Defendants' construction would cover a multiband antenna that was actually three single-band antennas arranged together, because it does not require any sharing or overlap of geometric elements between the different portions of a multiband antenna. (*Id.*) According to Plaintiff, the patentees distinguished this exact configuration during reexamination. (*Id.* (citing Dkt. No. 77-9 at 4).) Plaintiff further argues that the specification also distinguishes the claimed antennas from designs that achieve multiband radiation by grouping single band antennas and from arrays. (*Id.* at 21 (citing '432 Patent at 3:45–49).) Plaintiff also contends that Defendants' construction also incorrectly requires that the first, second, and third portions "differ in size or configuration." (*Id.*) According to Plaintiff, this requirement is included in dependent Claims 6, 10, and 12 of the '432 Patent. (*Id.*)

Defendants contend that the ordinary meaning of "within" is "inside" or "enclosed." (Dkt. No. 82 at 15 (citing Dkt. No. 82-4).) Defendants also argue that their construction relies on ordinary meaning to require that the first portion, the second portion, and the third portion differ in size or configuration. (*Id.*) Defendants contend that the passages cited by Plaintiff do note support Plaintiff's construction that "within" means "share." (*Id.* at 16 (citing '432 Patent at 2:39–41, 3:16–18).) Defendants further argue that the word "overlap" appears only once in the specification, and that the term is not used in Plaintiff's construction. (*Id.* (citing '432 Patent at 5:15–21).)

Regarding the prosecution history, Defendants argue that Plaintiff's statements are self-serving, and are entitled to no weight. (*Id.*) Defendants further argue that the PTO rejected Plaintiff's construction as not supported by the specification under the PTO's broadest reasonable interpretation ("BRI") standard. (*Id.* (citing Dkt. No. 82-5 at 21).) According to Defendants, if

Plaintiff's construction was rejected under the BRI standard, it must also be rejected under the *Philips* standard. (*Id.*) Finally, Defendants contend that Plaintiff's arguments regarding single band antennas have no evidentiary support, and that Plaintiff's claim differentiation argument lacks merits. (*Id.* at 17.)

Plaintiff replies that it explicitly defined "substantially within" during reexamination. (Dkt. No. 85 at 7 (citing Dkt. No. 77-9 at 3).) Plaintiff contends that its "share" requirement is narrower than Defendants' "enclosed" requirement. (*Id.* at 8.) According to Plaintiff, the Court is not bound by the PTO's BRI construction, which is a broader construction standard than *Phillips*. (*Id.*) Plaintiff further argues that its construction prevents the claims from covering a grouping of single band antennas. (*Id.*) According to Plaintiff, the specification explicitly disclaims a configuration that achieves multi-band performance by grouping together single-band antennas. (*Id.* (citing '432 Patent at 3:45–49).) Plaintiff argues that the claims do not cover a configuration comprising three independent portions, because the portions must overlap or share some geometry. (*Id.*)

Plaintiff further argues that Defendants provide no intrinsic support for their proposed construction of "inside or enclosed." (*Id.*) Plaintiff also contends that Defendants' argument is incorrect because it requires the portions to "differ in size or configuration," which would import a limitation from dependent Claims 6, 10, and 12 of the '432 Patent into independent Claim 1. (*Id.*)

For the following reasons, the Court finds that the phrase **"said second [and third] portion[s] being located substantially within the first portion"** should be construed to mean **"the second [and third] portion[s] has an area that substantially overlap[s] an area of the first portion, where the portions differ in size or configuration."** The Court further finds that the phrase **"at least substantial parts of said second and third portions being part of the first**

portion" should be construed to mean **"the second and third portions have areas that substantially overlap an area of the first portion, where the portions differ in size or configuration."** The Court also finds that the phrase **"a [second/third] portion located substantially within the first portion"** should be construed to mean **"the [second/third] portion has an area that substantially overlaps an area of the first portion, where the portions differ in size or configuration."**

2. Analysis

The phrase "said second [and third] portion[s] being located substantially within the first portion" appears in Asserted Claim 1 of the '431 Patent; and Asserted Claim 1 of the '432 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same general meaning in each claim. The phrase "at least substantial parts of said second and third portions being part of the first portion" appears in Asserted Claim 17 of the '541 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same general meaning in each claim. The phrase "a [second/third] portion located substantially within the first portion" appears in Asserted Claim 17 of the '617 Patent; and Asserted Claim 17 of the '632 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same general meaning in each claim.

The Parties' dispute centers on the meaning of the words "substantially within." The Court finds that the intrinsic evidence indicates that "substantially within" means the second or third portion "has an area that substantially overlap[s] an area of the first portion." During the reexamination, the patentees consistently characterized "substantially within" as requiring overlapping areas. *See Aylus Networks, Inc. v. Apple Inc.*, 856 F.3d 1353, 1360 (Fed. Cir. 2017) (noting that statements made by the patentee during reexamination can be used during claim construction). Specifically, the patentees explained that "in the context of the specification, the

recited 'second portion being located substantially within the first portion' means that the second portion has an area that 'shares' or 'overlaps' an area of the recited first portion." (Dkt. No. 77-9 at 3.) The patentees repeated this argument multiple times. (*Id.* at 7–8, 10, 13.) Accordingly, the Court finds that this intrinsic evidence informs the proper meaning of the disputed phrases.

Turning to Defendants' construction, the only support Defendants provide is an extrinsic dictionary definition. Given that the patentees used a coined term (i.e., "Multilevel") to describe the geometric relationships, the Court is not persuaded that an extrinsic definition should be given more weight than the prosecution history. Defendants characterize the prosecution history statements as "self-serving advocacy." The Court disagrees, and notes that the patentees argued that the claim was distinguishable because the "substantially within" limitation would not include three concentric "stand-alone" antennas. (Dkt. No. 77-9 at 3–4.)

According to Defendants, a second portion is substantially within a first portion if the second portion is merely enclosed by the first. Defendants' construction would appear to include three single-band antennas arranged together, because their construction does not require any sharing or overlapping of areas between the different portions. As indicated, both the specification and prosecution history distinguish the claimed antennas from designs that achieve multiband radiation by grouping single band antennas. *See, e.g.*, '432 Patent at 3:45–49.

Defendants also argue that the examiner rejected the patentees' argument as not supported by the specification under the PTO's broadest reasonable interpretation ("BRI") standard. (Dkt. No. 82 at 16.) Defendants correctly argue that a patentee's statements to the PTO cannot broaden its claims beyond the original disclosure. (*Id.* at 16 (citing *Honeywell Int'l, Inc. v. ITT Indus., Inc.*, 452 F.3d 1312, 1319 (Fed. Cir. 2006)).) However, that is not the case here because it is actually Defendants' construction that would recapture the disclaimed embodiments.

Regarding the proposed "differ in size or configuration" language, Plaintiff argues that this would add limitations from three dependent claims, and render the claims superfluous. (Dkt. No. 77 at 21.) The Court disagrees. The dependent claims generally add requirements that the second and third portions are smaller than the first portion. The proposed construction does not impose any specific size requirements, and may even include portions that are the same size, assuming they have a different configuration. This is required because the intrinsic evidence indicates that the first portion differs in size or configuration from the second and third portions. *See, e.g.*, '432 Patent at 3:41–45 ("The number of frequency bands is proportional to the number of scales or sizes of the polygonal elements or similar sets in which they are grouped contained in the geometry of the main radiating element."). Indeed, the patentees made this argument during the reexamination to distinguish Claim 1 of the '431 Patent. (Dkt. No. 77-9 at 3.) Finally, in reaching its conclusion, the Court has considered the extrinsic evidence submitted by the Parties, and given it its proper weight in light of the intrinsic evidence.

3. Court's Construction

For the reasons set forth above, the Court construes the phrase **"said second [and third] portion[s] being located substantially within the first portion"** to mean **"the second [and third] portion[s] has an area that substantially overlap[s] an area of the first portion, where the portions differ in size or configuration."** The Court further construes the phrase **"at least substantial parts of said second and third portions being part of the first portion"** to mean **"the second and third portions have areas that substantially overlap an area of the first portion, where the portions differ in size or configuration."** The Court also construes the phrase **"a [second/third] portion located substantially within the first portion"** to mean **"the**

[second/third] portion has an area that substantially overlaps an area of the first portion, where the portions differ in size or configuration."

I. "the second portion is a second level of structural detail within the first level of structural detail"

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"the second portion is a second level of structural detail within the first level of structural detail"	"all the geometric elements of the second portion are shared with the first portion"	"the second portion is a second level of structural detail inside or enclosed by the first level of structural detail, where a level of structure detail is clearly identifiable from another level of structural detail"

1. The Parties' Positions

The Parties' dispute is essentially the same as the previous term, except the previous term recited "substantially within," and this phrase only recites "within." Plaintiff argues that the patentees added the "within" limitation during reexam in response to a rejection over Johnson, a tri-band antenna. (Dkt. No. 77 at 22 (citing Dkt. No. 77-14 at 9, 21, 23–24.) Plaintiff contends that the PTO accepted this argument in its Notice of Allowance. (*Id.* (citing Dkt. No. 77-14 at 4).) According to Plaintiff, the patentees' arguments were based on the premise that "within" requires complete overlap of geometric elements. (*Id.* at 23 (citing Dkt. No. 77-14 at 23–24).) Plaintiff contends that the patentees argued that the second radiating portion was not within the first radiating portion in Johnson. (*Id.* (citing Dkt. No. 77-14 at 23–24).) Regarding Defendants' construction, Plaintiff argues that it incorporates the unrelated concept that the second portion must be "enclosed by" the first portion. (*Id.*) Plaintiff also argues that Defendants' construction adds limitations relating to the term "level of structural detail." (*Id.*)

Defendants respond that their construction, and supporting reasons, for the last limitation apply here as well. (Dkt. No. 82 at 17.) Defendants argue that in distinguishing Johnson, Plaintiff

relied on the ordinary meaning of the claim term "within." (*Id.*) Defendants contend that Plaintiff did not argue that Johnson failed to disclose the "within" limitation due to "the lack of complete overlap between the first and second radiating portions." (*Id.*)

Plaintiff replies that it distinguished Johnson on the grounds that the second portion was not "within" the first portion during reexam (Dkt. No. 85 at 8–9 (citing Dkt. No. 77-14 at 23).) Plaintiff contends that it added the "within" limitation to overcome a rejection based on Johnson. (*Id.* at 9 (citing Dkt. No. 77-14 at 9).) Plaintiff argues that the patentees' discussion of Johnson is the best place to look when construing "within." (*Id.*) Plaintiff further argues that Defendants make no attempt to analyze or synthesize the patentees' Johnson-related arguments, nor do they cite any statements supporting "enclosed." (*Id.*) Plaintiff contends that the PTO accepted its arguments and issued the claims. (*Id.* (citing Dkt. No. 77-14 at 4).)

For the following reasons, the Court finds that the phrase **"the second portion is a second level of structural detail within the first level of structural detail"** should be given its **plain and ordinary meaning.**

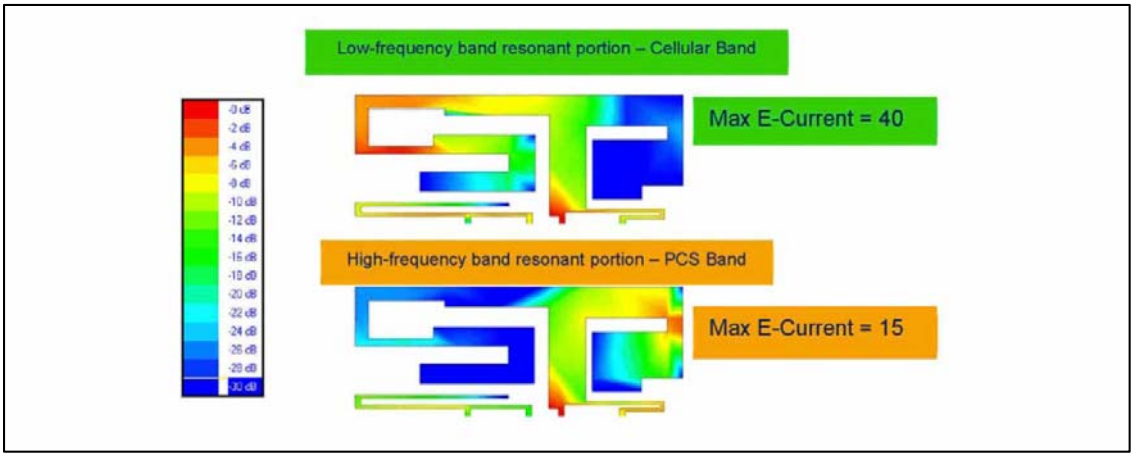
2. Analysis

The phrase "the second portion is a second level of structural detail within the first level of structural detail" appears in Asserted Claims 14 and 30 of the '431 Patent; and Asserted Claim 6 of the '432 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same general meaning in each claim. The Court first notes that the disputed terms "second level of structural detail" and "first level of structural detail" are included within this disputed phrase, and that Plaintiff's construction completely removes these disputed phrases. Defendants' construction does not have this issue, but instead construes "within" to mean "inside

or enclosed." As discussed above, the problem with Defendants' construction is that it is based on extrinsic evidence and could capture a disclaimed embodiment.

Plaintiff presents one new argument to support its construction. Plaintiff contends that for the same reasons as "substantially within," the term "within" requires a complete overlap or sharing or geometric elements. (Dkt. No. 77 at 22.) Plaintiff argues that the patentee added the "within" limitation during reexam in response to a rejection over Johnson, a tri-band antenna. (*Id.*) The Court agrees.

In the reexam, the patentees argued that Johnson was actually multiple single band antennas pushed together. (Dkt. No. 77-14 at 21.) The patentees further argued that because there was minimal overlap between the first and second portions, the second portion was not "within" the first portion. (*Id.* at 23–24.) The patentees included a simulation of Johnson's antenna, and argued that Johnson was actually two separate antennas "which only overlap in the areas close to their shared feed point." (*Id.* at 23.) The simulation below shows the current density of the antenna at the two different operating frequencies, with blue indicating that this portion of the antenna is not radiating at the particular frequency. (*Id.*)



(*Id.* at 23.) The patentees then argued that, as illustrated in the simulations, the second radiating portion was "not smaller *and within*" the first radiating portion. (*Id.* at 23–24 (emphasis added).)

Defendants respond that this is another example of Plaintiff trying to use its own self-serving advocacy. (Dkt. No. 82 at 20.) The Court disagrees.

Given the context of the claim language, the Court finds that the term "within" should be given its plain and ordinary meaning. The Court has construed the terms "second level of structural detail" and "first level of structural detail." Thus, the claim language will read as follows: "the second portion is a second [detail that clearly shows most of the individual elements] within the first [detail that clearly shows the overall structure]." As discussed, Plaintiff's construction confuses the claim language by completely dropping the two "level of structural detail" terms. Defendants' construction appears to read on a distinguished and disclaimed embodiment of multiple single-band antennas pushed together.

When considered in the context of the construction for the two "level of structural detail" terms, the disputed phrase is easily understandable by a jury, and should be given its plain and ordinary meaning. As discussed above, a person of ordinary skill would understand that "within" requires the area of the individual elements of the second portion to completely overlap with an area of the first portion. Finally, in reaching its conclusion, the Court has considered the extrinsic evidence submitted by the Parties, and given it its proper weight in light of the intrinsic evidence.

3. Court's Construction

For the reasons set forth above, the phrase **"the second portion is a second level of structural detail within the first level of structural detail"** will be given its **plain and ordinary meaning.**

J. "overall structure of the conductive radiating element" / "overall structure"

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"overall structure of the conductive radiating element"/ "overall structure"	"any portion of the antenna that radiates in one or more of the claimed frequency band(s)"	No construction necessary; plain and ordinary meaning applies.

1. The Parties' Positions

The Parties dispute whether the term "overall structure" should be construed as "any portion of the antenna that radiates," as Plaintiff contends. Plaintiff argues that the use of "comprising" in Claim 1 of the '431 Patent indicates the multi-band antenna may include more than just the conductive radiating element. (Dkt. No. 77 at 24.) According to Plaintiff, this is consistent with the specification that makes clear that the radiating element can be a portion of the antenna. (*Id.* (citing '432 Patent at 3:11–15, 5:62–65, 3:48–52).) Plaintiff further argues that the patentees explained during reexam that "multilevel structures nest structural levels of details (e.g., the overall structure, and smaller structures within the overall structure) wherein these nested structural levels of detail give rise to frequency bands." (*Id.* at 25 (citing Dkt. No. 77-14 at 15).) Plaintiff also contends that the patentees distinguished a reference on the grounds that its first portion did not comprise the overall structure of the conductive radiating element because the second portion contained regions that were not active in the first portion. (*Id.* (citing Dkt. No. 77-14 at 23–24).)

Defendants respond that the specification uses the term "overall structure" without assigning any special meaning to this phrase. (Dkt. No. 82 at 18 (citing '432 Patent at 2:38–39, 2:62; 5:2–3).) Defendants argue that Plaintiff contends that the tiniest portion of a radiating element that radiates in a claimed frequency range would constitute the overall structure of the radiating element. (*Id.*) Defendants contend that Plaintiff's citations to the specification and file

history do not support its construction of "overall structure." (*Id.*) Defendants also argue that Plaintiff's inclusion of "the claimed frequency band(s)" in this limitation is puzzling, because these particular claims all recite a generic "selected frequency band." (*Id.*) Defendants contend that it is not helpful to add "the claimed frequency band(s)" in the construction where the only antecedent for a "claimed frequency band" is a non-descript "selected frequency band." (*Id.*)

Plaintiff replies that Claim 1 of the '432 Patent unambiguously recites that the "conductive radiating element" can be less than the "multi-band antenna." (Dkt. No. 85 at 9.) Plaintiff also argues that the specification contains multiple examples where the radiating element forms only part of the antenna. (*Id.* (citing '432 Patent at 3:11–15, 5:62–65).) Plaintiff also contends that "claimed frequency bands" is dictated by the claim language. (*Id.*) Plaintiff argues that because the conductive radiating element is composed of all the geometric elements included in the first, second, and third portions, it therefore is composed of all the elements that radiate in the first, second, and third frequency bands. (*Id.*)

For the following reasons, the Court finds that the terms **"overall structure of the conductive radiating element"** and **"overall structure"** should be given their **plain and ordinary meaning.**

2. Analysis

The terms "overall structure of the conductive radiating element" and "overall structure" appear in Asserted Claims 1 and 6 of the '432 Patent; Asserted Claims 1, 14, and 30 of the '431 Patent; and Asserted Claim 17 of the '541 Patent. The Court finds that the terms are used consistently in the claims and are intended to have the same general meaning in each claim. The Court further finds that the terms are unambiguous, and are easily understandable by a jury, and

should be given their plain and ordinary meaning. The Summary of the Invention ("Summary") states the following:

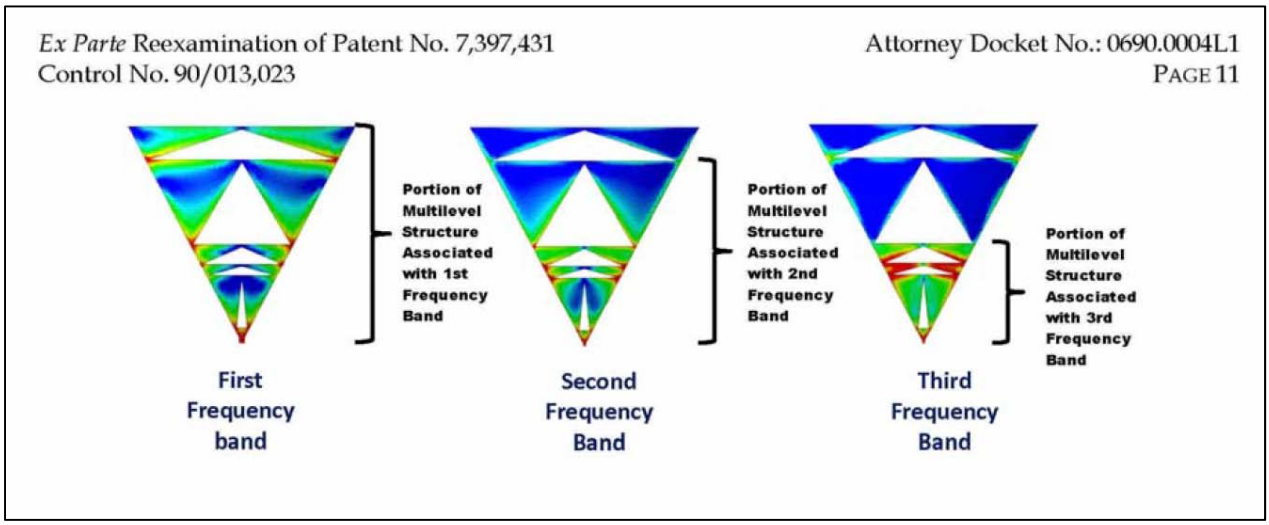
> *The present invention consists of an antenna whose radiating element is characterised by its geometrical shape* . . . Its designation as multilevel antenna is precisely due to the fact that in the body of the antenna *can be identified at least two levels of detail: that of the overall structure and that of the majority of the elements (polygons or polyhedrons) which make it up.* This is achieved by ensuring that the area of contact or intersection (if it exists) between the majority of the elements forming the antenna is only a fraction of the perimeter or surrounding area of said, polygons or polyhedrons.

'432 Patent at 2:44–67 (emphasis added). As indicated, one "level of detail" is the "overall structure of the conductive radiating element." This is recited in the claims, and in this context, the term is not overly technical or confusing. Accordingly, the Court finds that the term does not require construction.

Plaintiff contends that the overall structure of the conductive radiating element can be less than the entire physical antenna. (Dkt. No. 77 at 24.) According to Plaintiff, the use of "comprising" in the claim indicates that the multi-band antenna may include more than just the conductive radiating element. (*Id.*) Although true, this is neither foreclosed or implicated by the disputed term. Instead, the plain language of the claim recites the "overall structure *of the conductive radiating element*," and not the "overall structure *of the antenna*." Plaintiff's construction would read out the first level of detail (i.e., overall structure of the conductive radiating element) and replace it with "any portion of the antenna." This would be an improper redrafting of the claim language.

Plaintiff also contends that the patentees explained during reexam that "multilevel structures nest structural levels of details (*e.g.*, the overall structure, and smaller structures within the overall structure) wherein these nested structural levels of detail give rise to frequency bands." (*Id.* at 25 (citing Dkt. No. 77-14 at 15).) The issue is not whether there can be "nested structural

levels," but instead is what the term "overall structure of the conductive radiating element" means. The patentees statement confirms that the "overall structure" is not just "any portion" of the antenna, but instead is the "overall structure of the conductive radiating element." Indeed, the patentees included the following annotated version of a simulation to support its argument:



(Dkt. No. 77-14 at 16.) The patentees further argued that "[a]s illustrated, the successively smaller scales of these level *within the overall structure* give rise to the different frequency bands." (Dkt. No. 77-14 at 16 (emphasis added).) Consistent with the claims and the specification, the patentees identified the first level of detail as the "overall structure of the conductive radiating element," and not just "any portion of the antenna that radiates." Accordingly, the Court rejects Plaintiff's construction because it improperly redrafts the claim language.

Finally, Plaintiff argues that the specification contains multiple examples where the radiating element forms only part of the antenna. (Dkt. No. 85 at 10.) The Court agrees that the claims and the specification indicates that a part of the antenna radiates. Indeed, this is what is illustrated in the simulation provided in the reexam. However, the issue is not whether a part of the antenna can radiate, because this is explicitly recited in the claim. The issue is what a person of ordinary skill in the art would understand the term "overall structure of the conductive radiating

element" to mean. For the reasons stated above, the Court rejects Plaintiff's construction and finds that the term should be given its plain and ordinary meaning.

3. Court's Construction

For the reasons set forth above, the terms **"overall structure of the conductive radiating element"** and **"overall structure"** will be given their **plain and ordinary meaning.**

K. "frequency band"

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"frequency band"	"a range of frequencies extending between two limiting frequencies"	"a range of frequencies"

1. The Parties' Positions

The Parties agree that "frequency band" means at least "a range of frequencies." The Parties dispute whether the construction should further specify that the "frequency band" is "extending between two limiting frequencies." Plaintiff argues that the Court should adopt the prior construction that a frequency band is "a range of frequencies extending between two limiting frequencies." (Dkt. No. 77 at 25 (citing Dkt. No. 77-3 at 32).) According to Plaintiff, "frequency band" is a straightforward term given its ordinary meaning. (*Id.*). Plaintiff argues that every time the Asserted Patents use the term "frequency band," they describe a range with defined endpoints. (*Id.* (citing '432 Patent at 8:36–39).)

Defendants respond that the specification does not provide a definition for frequency bands. (Dkt. No. 82 at 19.) Defendants concede that the specification discloses some exemplary embodiments, but argue that it does not limit the invention to any frequencies within a specifically bound frequency range. (*Id.* (citing '432 Patent at 7:42–43, 8:54–55).) Defendants contend that without any guidance from the specification on the term "limiting frequency," they do not see how the addition of that term to a "range of frequencies" will be helpful. (*Id.*)

Plaintiff replies that the Court should adopt the same construction given in the prior litigation. (Dkt. No. 85 at 10.) Plaintiff contends that frequency band has defined endpoints (*i.e.*, limiting frequencies), and Defendants have not explained how a range of frequencies would not extend between two limiting frequencies. (*Id.*)

For the following reasons, the Court finds that the term **"frequency band"** should be construed to mean **"a range of frequencies."**

2. Analysis

The term "frequency band" appears in Asserted Claims 14 and 30 of the '431 Patent; Asserted Claim 6 of the '432 Patent; Asserted Claims 32 and 46 of the '069 Patent; Asserted Claims 1 and 11 of the '421 Patent; and Asserted Claims 17 and 23 of the '541 Patent. The Court finds that the term is used consistently in the claims and is intended to have the same general meaning in each claim. The Parties agree that "frequency band" means at least "a range of frequencies." The Parties dispute whether the construction should further specify that the "frequency band" is "extending between two limiting frequencies." The Court finds that the additional language is unnecessary, because it is understood that a "range" has two endpoints. Indeed, the specification discloses embodiments that operate in frequency "bands" having two endpoints. For example, the specification states the following:

> Below are described, for purposes of illustration only, two non-limiting examples of operational modes for Multilevel Antennae (AM1 and AM2) for specific environments and applications.
>
> Mode AM1
>
> This model consists of a multilevel patch type antenna, shown in FIG. 8, which operates simultaneously *in bands GSM 900 (890 MHz-960 MHz) and GSM 1800 (1710MHz-1880 MHz)* and provides a sector radiation diagram in a horizontal plane. The antenna is conceived mainly (although not limited to) for use in base stations of GSM 900 and 1800 mobile telephony.

'432 Patent at 7:39–46 (emphasis added). Accordingly, the specification indicates that a frequency band has defined endpoints. To the extent that a party contends that a range does not have endpoints, the Court rejects this argument.

Plaintiff contends that the Court should adopt its construction because it is how the term was construed in the prior litigation. However, the parties in that case did not dispute "limiting frequencies." In fact, the defendant in that case proposed it in its construction. Here, Defendants concede that "the specification discloses some exemplary embodiments in the 890 MHz–960 MHz, D1710 MHz–1880 MHz, 1880 MHz–1930 MHz, and 3400–3600 MHz ranges," but argues that the specification "does not limit the invention to any frequencies within a specifically bound frequency range." (Dkt. No. 82 at 22.) Defendants contend that "without any guidance from the specification on the term 'limiting frequency,' [Defendant] does not see how the addition of that term to a 'range of frequencies' will be helpful." (*Id.*) The Court generally agrees with Defendants. There does not appear to be any benefit in adding more words to the Court's construction for this term. Accordingly, the Court does not adopt this portion of Plaintiff's construction.

3. Court's Construction

For the reasons set forth above, the Court construes the term **"frequency band"** to mean **"a range of frequencies."**

L. "fractal type antenna"

Disputed Term	Plaintiff's Proposal	Defendants' Proposal
"fractal type antenna"	"an antenna with a self-similar shape generated in an iterative manner"	"an antenna possessing ideal fractal geometry"

1. The Parties' Positions

The Parties dispute whether a "fractal type antenna" is a "an antenna with a self-similar shape generated in an iterative manner," as Plaintiff proposes, or "an antenna possessing ideal

fractal geometry," as Defendants propose. Plaintiff argues that the term "fractal" refers to an object whose shape repeats itself over multiple scales. (Dkt. No. 77 at 26.) Plaintiff contends that there is no such thing as a pure fractal antenna because fractal geometry is a mathematical abstraction. (Dkt. No. 77 at 26 (citing '432 Patent at 1:59–61).) Plaintiff further argues that it is possible to create a fractal-like antennas by truncating the antenna to a finite number of iterations that are self-similar. (*Id.* (citing '432 Patent at 1:61–63).) Plaintiff also contends that the most in-depth discussion of fractal antennas occurred during prosecution of the priority PCT application. (*Id.* (citing Dkt. No. 77-12 at 6–7).) According to Plaintiff, the patentees characterized fractal antennas as possessing "self-similarity or self-scaling of the geometry" and described fractal antennas as "self-similar object[s] fully decomposed into a number of parts which shape is equal to the shape of the overall object." (*Id.* (citing Dkt. No. 77-12 at 8, 15).) Regarding Defendants' construction, Plaintiff argues that it invites confusion, such as the number of times a shape must repeat itself in order to be "ideal." (*Id.*)

Defendants respond that in the prior litigation, Plaintiff proposed a construction of "multilevel structure" that explicitly disclaimed "fractal antennae." (Dkt. No. 82 at 20.) Defendants argue that the court was perplexed by the term "fractal," and the term "fractal" became a source of potential confusion during trial. (*Id.* (citing Dkt. No. 77-3 at 11–12; Dkt. No. 82-6 at 64).) Defendants contend that their construction tries to account for the fact that "strictly fractal antennae are impossible, as fractal objects are a mathematical abstraction which include an infinite number of elements." (*Id.* at 21 (citing '432 Patent at 1:59–61).) Defendants further argue that Plaintiff raises the same arguments that were previously rejected by the court in the prior litigation. (*Id.*) Defendants also contend that the argument presented to the EPO was also not correct. (*Id.*) Finally, Defendants argue that there are many examples in the specification of non-fractal

structures that fit Plaintiff's construction of fractal. (*Id.* (citing '432 Patent at at Figures 3.1, 4.1, 5.4, 6.6, 7.8).)

Plaintiff responds that the MLV patents teach that ideal "fractal objects exist only as an abstraction or a concept," and that antennas with an ideal fractal geometry are impossible. (Dkt. No. 85 at 10 (citing '432 Patent at 6:59–61).) Plaintiff argues that Defendants' construction would render the claim limitation "wherein the antenna element is not a fractal type antenna element" meaningless, because no real antenna could ever be a "fractal type antenna." (*Id.*) Plaintiff also argues that the figures in the specification are not "self-similar." (*Id.*) Plaintiff contends that none of the figures Defendants cite can be broken down into smaller parts that are equal to the overall structure, so none of these figures are "self-similar." (*Id.*) According to Plaintiff, its construction is fully consistent with the specification's teaching that Figures 1, 3, 4, 5 and 6 are not fractal. (*Id.*)

For the following reasons, the Court finds that the term **"fractal type antenna"** should be construed to mean **"an antenna with a self-copying shape generated in an iterative manner on different scaling levels."**

2. Analysis

The term "fractal type antenna" appears in Asserted Claim 1 of the '421 Patent. The Court first notes that the term appears in a negative limitation. Specifically, Claim 1 of the '421 Patent recites "wherein the antenna element *is not* a fractal type antenna element." '421 Patent at Claim 1 (emphasis added). What complicates the issue is that "[f]rom a scientific standpoint strictly fractal antennae are impossible, as fractal objects are a mathematical abstraction which include an infinite number of elements." '432 Patent at 1:59–61. The court in the prior litigation struggled with this term, and eventually instructed the jury that "this term, fractal, is both unclear, not precisely defined, not consistently used, and has different meanings, depending upon when, where,

and who is using it. It is not a reasonable descriptive—it is not a reasonably descriptive term." (Dkt. No. 82-6 at 64.) With this background, the Court turns to the intrinsic evidence.

The Court finds that the best indication of how a person of ordinary skill in the art would understand the term can be found in the prosecution history of PCT Application No. ES99/00296. To distinguish the prior art, the patentees argued that "the antennas that are implemented do not have a fractal geometry." (Dkt. No. 77-12 at 8.) The patentees further described the prior art as including a fractal antenna. (*Id.*) Specifically, the patentees argued that "[i]n the case of [the prior art] we find Illustrated in figures 2, 3 and 4 exclusively the fractal known as the Sierpinski triangle, where we can clearly observe that **it is formed by identical triangles** and that its geometry is obtained carrying out a self-copying on a different scaling level of the basic generating element of the structure." (*Id.* (emphasis in original).) Thus, the patentees described a fractal antenna as "self-copying [(*e.g.*, identical triangles)] on a different scaling level of the basic generating element of the structure." Accordingly, the Court finds that the term "fractal type antenna" should be construed to mean "an antenna with a self-copying shape generated in an iterative manner on different scaling levels."

Plaintiff contends that the most in-depth discussion of fractal antennas occurred during prosecution of the priority PCT application. (Dkt. No. 77 at 26). As discussed above, the Court agrees, but does not agree with Plaintiff's construction. Specifically, the Court finds the term "self-similar shape" is vague and potentially confusing to a jury. For example, Defendants argue that there are many examples of non-fractal structures in the specification that fit Plaintiff's construction. (Dkt. No. 82 at 21–22). Plaintiff replies that the figures are not "self-similar," and then provides a lengthy definition of what "self-similar" means. (Dkt. No. 85 at 10) ("By self-similar . . . should be understood a structure that can be broken into several parts that are ALL

equal to the overall structure. A self-similar object is fully decomposed into a number of parts which shape is equal to the shape of the overall object."). This shows the lack of clarity in Plaintiff's construction, because Plaintiff concedes that its construction requires further construction.

Defendants argue that their construction tries to account for the fact that "strictly fractal antennae are impossible." (Dkt. No. 82 at 21.) Defendants propose "possessing an ideal fractal technology," which it contends "is as close as humanly possible for an antenna design to be fractal." (*Id.*) Like Plaintiff's construction, Defendants' construction also creates more confusion than clarity. The specification states that ideal "fractal objects exist only as an abstraction or a concept," and that antennas with an ideal fractal geometry are impossible. Thus, Defendants' construction either renders the term meaningless, or raises the question of how close to impossible is "ideal." During the claim construction hearing, Defendants argued that an expert could determine if an antenna has "ideal fractal geometry." However, like Plaintiff's construction, this is effectively arguing that Defendants' construction requires further construction of the term "ideal."

3. Court's Construction

For the reasons set forth above, the Court construes the term **"fractal type antenna"** to mean **"an antenna with a self-copying shape generated in an iterative manner on different scaling levels."**

V. CONCLUSION

The Court adopts the constructions above for the disputed and agreed terms of the Asserted Patents. Furthermore, the Parties should ensure that all testimony that relates to the terms addressed in this Order is constrained by the Court's reasoning. However, in the presence of the

jury the Parties should not expressly or implicitly refer to each other's claim construction positions and should not expressly refer to any portion of this Order that is not an actual construction adopted by the Court. The references to the claim construction process should be limited to informing the jury of the constructions adopted by the Court.

So ORDERED and SIGNED this 7th day of September, 2018.

RODNEY GILSTRAP
UNITED STATES DISTRICT JUDGE